

The
HARTFORD
STEAM
BOILER
Inspection &
Insurance
Company



A HISTORICAL REVIEW BY

❖ Wilson Wilde ❖

To Our Readers:

In 1977 I had the honor of addressing the Newcomen Society in Mystic, Connecticut, and presenting to the Society the history of The Hartford Steam Boiler Inspection and Insurance Company. Even though that address was given only a few years ago, significant changes have occurred at Hartford Steam Boiler—changes we wish to incorporate in our brief history in order that it may accurately represent not only what we were but what we are today and what we hope to be in the future.

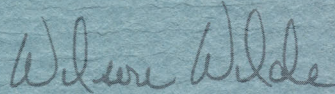
We have reprinted here, in its entirety, the address given in Mystic and are adding to that a brief update for the period since.

The illusive quest for a solution to this country's energy needs is still one of significant concern to our people, industry, and government. Steps, no matter how tentative, are being taken to answer these needs. The response of the people conserving energy and finding viable, reasonable solutions to permit economic gain and environmental safety surely typifies how great and bright the hope for the future is. The Hartford Steam Boiler Inspection and Insurance Company is better positioned than ever before to respond to the challenges of the 1980's and beyond. We have a larger, better trained staff with significantly improved information systems. We have segmented our market and increased our useful market research capability. We have adopted formal business plans for both the short and longer term. Our loss prevention capabilities are improving at a rapid rate. We are adopting new techniques and procedures that are certain to distinguish our capabilities from those of our competition.

Our rapidly growing engineering services businesses provide an opportunity to reduce the volatility of our earnings which reflect the insurance underwriting cycle. This country's need for the kinds of engineering services we are now providing cannot help but grow rapidly in the foreseeable future. The need for alternate energy sources with appropriate concern for the environment seems obvious. The public concern for safety has been increasing with virtually every session of Congress and with every major accident, be it Three Mile Island, the DC 10's, the loss of an offshore platform, railroad tank car accidents, bridge collapses, coliseum roof collapses and many, many more.

We believe just as we did in 1866 that HSB is ready for the challenges of today and the future.

Very truly yours,



PRESIDENT

LATE IN THE EIGHTEENTH CENTURY, that bright phenomenon known as the Industrial Revolution burst upon America and Western Europe. Progress became the watchword. Never had the world experienced such an awesome, compelling revelation of man-made power. By the mid-nineteenth century, industry had changed the habits of the world, and had begun to change its physical face as well. Artists began to paint factories belching fire in preference to farmhouse chimneys wafting smoke. No river scene was complete without its steamboat, no landscape lacked its railroad tracks.

In England, Charles Dickens described the soot and sweat of a bustling, industrialized London in his work, *Great Expectations*, published in 1861. His crusade against social evils was being duplicated in America by our most capable critics. Transcendentalism as expressed in New England by Emerson, Thoreau and Hawthorne was extolling the virtues of individualism, self-reliance and the need for social reform. The rapidly changing world, while winning the praise of Emerson, was often viewed in an uncomplimentary way through the poetry of Walt Whitman, Emily Dickenson and Margaret Fuller.

Industrialization of America and Western Europe was possible, in part, because of the ample supply, of fuel at stable prices. Steam was increasingly the vehicle used to transfer that fuel to useful work, while improved designs of industrial machinery were making more efficient use of that steam. In 1863, Emerson noted, "Steam is no stronger now than it was a hundred years ago, but it is put to better use."

However, with the exception of a few perceptive people like Emerson, the critical dependence of industrial progress upon its energy sources and its energy technology was not noticed. For the nineteenth century, obsessed with the magnitude of unleashed power, with the sights, sounds, and innovations of an age of mass production, the important

industrial issues were aesthetic and political. Even the first half of the twentieth century did not recognize that continuing industrial growth creates an ever-increasing need for energy, and for the mechanical means to make it safe and economical.

This is the history of a company that has focused its attention on the safe, reliable, and efficient use of energy, and in recent years, on technologies for the development of energy resources. The Hartford Steam Boiler Inspection and Insurance Company has been involved with the efficient harnessing of power since its inception in the mid-nineteenth century, when the burgeoning industrial economy used steam to drive its machines, its locomotives and riverboats, when the sources of energy seemed infinite, but the ways of controlling the power that was generated were still undeveloped and erratic.

Hartford Steam Boiler was founded in response to a need for better technology and operating procedures in the generation and utilization of steam. It has grown with America, broadening its concerns as the applications of power have become more complex, and potentially more dangerous.

The Hartford Steam Boiler Inspection and Insurance Company grew out of an informal organization called the Polytechnic Club, which was founded in 1857, by several young Hartford businessmen, to study scientific phenomena and its practical utilization. At this time, steam was the major source of industrial and vehicular power in the United States, although it was still under imperfect control. Very little was known about its properties, or what caused steam boiler explosions. People who owned or ran industrial concerns simply assumed that sooner or later their boilers would explode, and they would lose their boiler operator and perhaps one or two other workers. And, in fact, in America in the 1850s, there was one steam boiler explosion every four days.

Members of the Polytechnic Club addressed themselves to the question of boiler explosions because, increasingly,

steam was becoming the primary source of power for the nation's industrial plants. In the nineteenth century, science was, by today's standards, comparatively primitive and full of superstition. Technological research was the province of the intellectual generalists, men like Samuel Taylor Coleridge and Humphry Davy, who wrote poetry, farmed, and theorized about thermo dynamics. It is therefore not incredible that people believed that explosions were caused by Acts of God, or by a demon in the boiler. Others speculated that boilers erupted when steam broke down into oxygen and hydrogen and recombined explosively — a theory not unlike that of spontaneous combustion, which was widely accepted at the time.

The Polytechnic Club preferred to consider practical ways of dealing with scientific problems. They came to the not unreasonable conclusion that boiler explosions occurred because the pressure within the boiler at some point became greater than the ability of the boiler to withstand it. Good quality materials and better design for boilers would help retard boiler deterioration, while periodic inspection of boilers for weaknesses, or factors that might contribute to deterioration, would allow explosions to be anticipated and prevented.

By 1860 members of the Polytechnic Club debated a new concept that was to combine a guarantee with the inspection, thus giving both parties a financial interest in the safety of the boiler. The inspections, they felt, would increase boiler safety, while something called insurance would function both as an incentive to inspect, and as a guarantee of the quality of that inspection. It is interesting to note that insurance was secondary to loss prevention.

The outbreak of the Civil War, however, interrupted their planning and in fact caused the Polytechnic Club to disband.

In 1865, the boiler of the Mississippi River Steamboat *Sultana* exploded, killing over 1200 people. Shortly thereafter, two members of the old Polytechnic Club, Jeremiah Allen and Edward Reed, decided to act upon those earlier

discussions and to set up an organization to inspect and insure steam boilers. And so, on June 30, 1866, The Hartford Steam Boiler Inspection and Insurance Company was incorporated.

At its inception, the new Company was concerned primarily with safety, but not unconcerned with both efficiency and economy. It continued to follow the basic premises of the Polytechnic Club, avoiding the purely speculative, and concentrating upon the practical applications of the developing technology of steam power.

The true beginning of Company operations was in 1867, when J. M. Allen, one of the founders, assumed the Presidency. Allen considered Hartford Steam Boiler "the first institution in America devoted primarily to industrial safety." Through his knowledge, his unceasing research, and his great dedication, HSB's services grew in diversity and in excellence. President Allen, so the official records tell us, "made frequent trips, often traveling by night and using honeyed words of persuasion by day to sell his Company's policies." Even in his leisure time he studied the development of rigidly scientific methods, and he was often called upon to identify hidden causes of trouble and to remedy practical problems with his scientific knowledge.

Municipal and state authorities throughout the country began accepting Hartford Steam Boiler's inspections in place of their own as certification that a boiler was in a safe condition to operate. In 1870, HSB began an inspection service for manufacturers, which supervised the construction of boilers from the selection of materials right through to setting and installation. Nine years later the Company began offering boiler design services to its policyholders. This new service required the formal creation of an engineering department. President Allen personally researched and tested the specifications for boiler construction, with the result that "Hartford Standards" became the specifications used by virtually all boiler makers in the United States.

In addition, Hartford Steam Boiler helped to improve the technology of boiler settings, and it was the "Hartford

Setting” that also became the standard for the boiler industry.

In describing the founding of HSB, the historian P. Henry Woodward, who wrote in the late 1800s, remarked that by 1857 two attempts in Hartford to introduce novel and untried forms of insurance had proved notably successful. The author observed that “in both cases the result, made more striking by the failure of imitators and short-lived rivals, was clearly due to intelligence and the skillfulness of management.”

Mr. Woodward further observed that “for its first five years, Hartford Steam Boiler occupied a single room, 16-by-18-foot square, and for the same period, the floor of the vault was spread with papers for the protection of the books, from the unwillingness of the officers to go to the extravagance of fitting it up with shelves.” In a moment of self-indulgence, the President did invest \$14 in a desk for his own use, but such outbreaks of luxury seldom occurred. (I might add that I have been getting some pressure from my associates to replace that desk.)

Throughout the latter half of the nineteenth century, Hartford Steam Boiler operated as a highly profitable single line insurance Company, growing in size, strength, and reputation. It was, in fact, not simply an insurance company, but an organization primarily concerned with accident prevention and the operating efficiency of insured equipment. President Allen himself continued to make personal studies of boiler explosions and collected significant fragments of exploded boilers in an attempt to identify factors which caused a given boiler to explode. In so doing, he began what we now refer to as data collection and failure analysis.

Although HSB crossed the Canadian border in the late 1860s to write a few policies, the Canadian Steam Users Insurance Association was chartered in 1875 and HSB felt it should not compete with the newly formed company. In 1905, however, the HSB directors voted to seek admission to Canada, and authorized the President to negotiate for the purchase of all of the capital stock of the Canadian Association, which had by then changed its name to The

Boiler Inspection and Insurance Company of Canada. The acquisition was completed in 1907. At that time, the Canadian company did three-fourths of all the boiler insurance business in the Dominion, and remains today its leading insurer.

By the time of Allen's death in 1903, Hartford Steam Boiler had grown from a fledgling, local organization to a leading insurance company in America — pre-eminent in the research and application of energy for the benefit of mankind.

Lyman Bushnell Brainerd became President of Hartford Steam Boiler in 1904. These early years of the twentieth century were a time of strong growth for the Company, a period when insurance and inspection service was extended to additional kinds of industrial equipment, such as flywheels. Like boilers, flywheels stored great quantities of energy and periodically exploded, causing death and destruction. These additions represented the Company's first step away from a sole concern with steam, and towards a concern with loss prevention for other forms of industrial equipment which generate, transmit and utilize energy. By this action, the Company indicated that it was *redefining its business* and that its future lay in applying the concepts and techniques of the founders to other areas of energy technology that would benefit from its engineering/inspection and insurance services.

In 1919, Hartford Steam Boiler began insuring engine breakdowns, for internal combustion as well as steam engines, for reciprocating pumps and for compressors. A year later, HSB expanded its services to include "electrical apparatus of any kind."

Each of these new lines of coverage required the inspection services of Hartford Steam Boiler. Through this diversification, HSB evolved the concept "engineering insurance," which signified the close relationship between its technological services and its insurance coverage.

All industrial activity relating to the generation or use of power was now to come within the purview of HSB:

where the Company felt or anticipated the need for its inspection and design expertise, there its insurance would follow, as an expression of confidence and a guarantee of technological quality.

World War I brought the United States its first taste of the need for energy conservation. To the war effort, Hartford Steam Boiler contributed its engineers and its expertise and helped demonstrate that efficient energy management can be a primary tool in energy conservation.

The years following the war, however, found Hartford Steam Boiler's customers installing new forms of machinery. Again, technological advances were changing the physical operations of the industrial world. The trend toward larger, more complex plants had accelerated, and with it the more extensive use of steam turbine generators and internal combustion engines in place of the familiar steam engine. Furthermore, the passage of the Prohibition Amendment in 1918 had shut down the domestic liquor industry, which had employed highly sophisticated machinery for steam power in its breweries and distilleries.

In 1923, Mr. Charles Blake, President of HSB at the time, published an article in the *Journal of Commerce* in which he predicted that the use of steam boilers as a form of power generation would never again rise to its former levels. What he didn't foresee was that steam boilers would not only survive but that they would play an even larger role as the primary means of power generation in our nuclear and fossil fuel plants. However, Blake's perception of an immediate problem was valid.

So, caught between the technology of change on the one hand, and the morality of reaction on the other, Hartford Steam Boiler had once again to assess its direction and affirm its commitment to engineering and insurance services for all methods of energy utilization. The Company began to concentrate more of its expertise upon equipment for the generation and utilization of electricity. It instituted insurance coverage and inspection services for furnace and pipe explosions that resulted from the accidental ignition of

combustible gases. So well did Hartford Steam Boiler respond to the opportunities of the twenties that it turned a period of possible decline into a period of growth. When William R. C. Corson became President of HSB in 1927, the Company was experiencing an unprecedented prosperity.

While the Depression had a significant impact on HSB, as it did upon virtually all other businesses, the Company managed to come through unusually well. It did not miss a single dividend payment, reduce a single salary, or dismiss a single employee for lack of work. HSB, in the early thirties, held its own and even made a little profit.

With the entry of the United States into World War II, industrial production underwent a sudden acceleration. The Company had an important self-interest in seeing that this country's power equipment and production machinery were properly maintained for maximum production as well as for safe operation. With factories running around the clock, failures were inevitable. HSB was actually operating with a reduced engineering staff. It was also contributing time and manpower to the Federal Government, as it had done during the previous war. The maintenance problems, the breakdowns, the need for replacement parts surpassed the capacity of HSB to keep up with them, and the Company suffered heavy losses. From this experience, HSB learned ironically that peak levels of industrial activity are not always good for business.

Shortly after the end of the war, Lyman B. Brainerd, the son of HSB's third President, assumed the Presidency. He was to shepherd in many important innovations in insurance coverage. While the evolution of the insurance business over the last 111 years has been extremely gradual, during Mr. Brainerd's 25 years of leadership the Company and the boiler and machinery insurance industry reached a new maturity, in terms of the broadness, flexibility, and convenience of its policies.

Every boiler and machinery policy, from the first ever written to those produced today, include two primary characteristics: a description of what equipment is to be insured,

and what constitutes an insured accident.

One of the major changes initiated by Mr. Brainerd was to broaden and simplify the coverages provided by the Company's policies. In the drawing up of these new policies, language was selected that would be as encompassing as possible. The terminology, "Breakdown involving physical damage" was introduced to cover a damage that can be seen or measured, even if it requires a microscope to do it.

Back in 1940, Hartford Steam Boiler had introduced a form of insurance coverage whereby they could designate all steam boilers or all flywheels in a given plant, rather than naming each one in the policy. The company then evolved the concept of "Broad" coverage, in which an industrial plant was insured against losses beyond that of explosion. In 1956, Hartford Steam Boiler wrote one of the first "comprehensive" insurance policies in the country; it helped standardize insurance coverage so that new policies would no longer have to be formulated for each industrial facility, or for each operational aspect of an industry.

It was also during President Brainerd's term of office that the packaging of insurance coverages came to the fore. This new packaging concept meant that the large multiple-line insurance Company could offer the business owner a simplified and less expensive collection of coverages which previously were provided by separate policies.

This development presented HSB, a single-line, specialty company, with one of the most serious decisions in its history. Since HSB was the only single-line company providing this coverage, packaging appeared to present a threat: it seemed to offer potential benefits to the customer, the producer, and the multiple-line company — indeed to everyone except HSB.

After many agonizing and lengthy discussions, the conclusion was reached that HSB would provide a reinsurance service. It would thus remain independent, while offering its services to multiple-line companies. HSB boiler and machinery coverages would be included in whatever package policies a cooperating company cared to design, but in the

name of the multiple-line company. In my judgment, managing this particular change was one of Mr. Brainerd's greatest contributions. Through his action, what appeared initially to be a potentially devastating blow to the oldest and largest specialty company was converted into an important development of economic benefit to customers and to all segments of the insurance industry.

In November of 1971, Mr. Brainerd stepped up to the position of Chairman of the Board, and I succeeded him as President and Chief Executive Officer. I inherited an extremely healthy, profitable, and highly respected specialty company.

With the recognition that change was both inevitable and desirable, and that HSB, and perhaps even the entire property and liability industry, had reached what economists label the mature stage in the life cycle of a product or an industry, it seemed an appropriate time again to consider the questions "what business are we in?" and "what business do we want to be in?" As a result of these deliberations, we set about to broaden the services the Company offered its customers, and to continue the HSB tradition of timely response to a changing environment.

First, in answer to the question "What business are we in?" the Company adopted a formal statement of purpose — one which would better communicate the nature of the Company's business and its future plans. That purpose is simply stated: "To provide technical and professional services which contribute to the safe, reliable, and efficient use of mechanical, electrical, and pressure equipment in the best interests of society."

You will note that the word insurance does not appear in that statement, which reinforces the concept that accident prevention rather than risk sharing is the primary concern of our business.

The key words "safe, reliable, and efficient" are not unlike those chosen by the previously mentioned historian, P. Henry Woodward, when he wrote almost one hundred years earlier, "The Company's activities embody the

principles taught by scientific research and approved by experience as made for the attainment of the highest degree of economy, efficiency, and safety."

To assist in the definition of "what business do we want to be in," the firm of Arthur D. Little was retained to make market studies of a dozen different engineering services that seemed to offer growth opportunities for the Company — services that at the same time would build on the Company's relative strengths and focus on the areas identified within its corporate purpose.

The result of these studies was the identification of a scientific research firm based in Austin, Texas, called Radian Corporation. A firm with the potential of providing the combined organization with unique capabilities in areas of promising growth, Radian appeared to be truly synergistic with HSB goals. On July 1, 1975, the merger of the two organizations was completed. To say that I am pleased with this combination would be a gross understatement.

A few words on Radian's specific activities should help define more clearly our Company's future direction. It was created in 1969 by a small group of scientists concerned with both energy and the environment. Radian today has a staff size of well over 300 which includes most of the major scientific disciplines . . . chemists, chemical engineers, physicists, mathematicians, meteorologists, biologists, geologists, metallurgists, mechanical and electrical engineers, and computer scientists.

It has been growing at an annual compound rate in excess of 40 percent per year, and the Company has earned a profit in every year of its existence. Their business? Contract research in areas such as environmental impact assessments, environmental monitoring, coal gasification and liquefaction, air, water, thermal, and noise pollution, waste disposal, computer science and mathematical modeling . . . all areas that relate to energy and the environment.

The addition of Radian to HSB allows our combined staffs to work together in solving basic problems for our customers, both corporate and governmental. While, through

Radian, HSB is engaged in research to benefit its largest customer groups, such as the paper industry, the electric utilities, the chemical industry, and primary metals, Radian's scientists are experimenting with the most sophisticated methods to detect accidents *before* they occur.

We have, for example, imbedded sensing devices inside major machines which continually measure such things as temperature, vibration, and acoustical emissions, and thereby help to identify significant changes. We are also developing techniques utilizing newly designed acoustical monitoring devices for locating imperfections or cracks in paper machine rolls.

The purpose of these efforts is the same as that of our founders: to apply scientific research to our customers' practical problems in order to improve the safety, reliability, and efficiency of their equipment.

We presently have under construction in Austin a Materials Science and Failure Analysis Laboratory which, when completed, will give us a scientific research capability greater than that of any other insurance company in the world. It will, in time, become a major research facility rivaling the sophistication of the laboratories of the major organizations outside of the insurance industry. While it may take a while to surpass the Bell Laboratories or the Batelle Institute, we're gaining on them.

HSB expects to grow in these and related areas through both internal growth and external acquisition. We are not considering entering any other line of insurance, nor do we intend to diversify beyond the areas I have identified. We do intend to expand our capabilities in the areas of professional and technical engineering services by adding any necessary support capabilities for those services.

We expect to serve both government and the private sector as their needs evolve. Research funded by government is typically public knowledge, and we hope to bring the benefit of that research to our customers in the private sector.

Energy will be an important part of our future as it has been an important part of our past. In my opinion, we

as a nation are not facing an energy crisis. We have a leadership crisis. I happen to believe we have more energy than we can possibly utilize in the foreseeable future.

There is at least five hundred years' worth of known coal reserves which can be gasified, liquefied, or scrubbed. I would remind you that the German war machine in WWII was operated on fuel derived from liquefied coal.

In the *presently* drilled oil wells in this country, we have extracted no more than 25 to 30 per cent of the oil known to be in those wells. Tertiary recovery techniques are well known, and could be relatively easily modified and improved, if we were to make the commitment.

Our Company's energy specialists tell me that in one twenty-mile-square area in Colorado, we have more oil than all the OPEC nations combined. In a larger area, perhaps several hundred miles square in the Far West, we have close to ten times as much oil as the OPEC nations combined. It is available to us if we will only commit ourselves to funding the necessary technology to extract oil from shale more economically.

We have the continental shelf, the sea, and, of course, nuclear fission and fusion, geothermal, solar, and, over the longer term, a wide variety of renewable forms of energy from many potential sources.

Our Representatives in Washington should stop fiddling with the minutia . . . pondering whether we should have a five-cent additional tax, which will be refunded, or whether every car that uses too much gas should be taxed a few hundred dollars.

This kind of taxation is not going to reduce consumption. (Automobile drivers in Paris today are paying \$1.80 per gallon for gas, and usage is continuing to grow.)

Our Representatives should be emphasizing resource development, not totally engrossed in conservation. The solution is to eliminate price controls, put a healthy tax on fuel, develop a trillion dollar trust fund, develop the technology necessary to take advantage of the almost limitless sources of potential energy together with the appropriate

related environmental controls, while at the same time, putting this country back into a healthy economic condition by reducing imports and increasing domestic investment.

We could meet all of our energy needs without damaging our environment, and restore economic growth as well if we only had a little more courage. We not only *can* afford it, we can't afford not to do it.

We in America have the capacity, we are developing the technologies, to fulfill all our needs and protect our natural assets. In its present and future directions and activities, we feel that Hartford Steam Boiler affirms a belief in progress, and in the power of progress to solve the problems it has created; and we participate in a vision much like Ralph Waldo Emerson's one hundred years ago:

"... we pity our fathers for dying before steam and galvanism, sulphuric ether and ocean telegraphs, photograph and spectroscope arrived, as cheated out of half their human estate. These acts open great gates of a future, promising to make the world plastic, and to lift human life out of its beggary to a Godlike ease and power."

1977 The Nondestructive Test Engineering Company was purchased in July, 1977, and is now operating as a division of the Engineering/Claim Department. The highly experienced test engineers and the sophisticated test methods and equipment that the firm has developed since it was first organized make it a valuable addition to our engineering capabilities, for insured risks, and for the engineering services we offer.

1978 1978 saw significant growth of revenues and profits from Radian's established operations. The Company's capabilities were expanded by the acquisition of two firms that operate in fields complementary to Radian programs that are concerned with environmental monitoring systems, equipment monitoring, and defense related research and development.

D.B. Associates, acquired in April, 1978, provides industrial hygiene services and related training programs for industry and government. Unitech, Inc., acquired in July, 1978, is engaged in the development and sale of highly sophisticated microprocessor based systems, and in research and development in the field of signal physics.

1979 In 1979 Radian purchased the ECHOSONDE product line from Scientific Engineering Systems of Reno, Nevada. ECHOSONDE is an acoustic device that measures upper level meteorological parameters that are important to scientists in their study of the dispersion of air pollutants discharged from major sources.

A Weigh-In-Motion machine developed by Radian's Unitech Products Group is a device designed to weigh trucks while they are in motion. This device makes available information on weight without the delays associated with conventional weighings of trucks on open highways. Product development efforts and further field experience during 1979 established the reliability and accuracy of WIM and led to

the sale of several systems. This product is a sample of the ability of the Company's engineers and scientists to develop products based on technological concepts derived from professional service programs.

The Hazardous Materials Laboratory was designed by Radian staff members and has attracted nationwide attention and acclaim as one of the foremost facilities of its kind in the world. The building and associated safety procedures are designed to allow safe handling of toxic, carcinogenic, teratogenic, and mutagenic compounds with a minimum risk of exposure for operating personnel and the surrounding environment.

1980 In May, 1980, Hartford Steam Boiler purchased Acoustic Emission International. Now a division of HSB, A. E. International in Richland, Washington, is a consulting, research and development organization that provides acoustic emissions inspection systems and services. The facility also designs, develops, and fabricates special acoustic emission inspection systems for field service testing.

In the course of its inspection activities, A. E. International utilizes sophisticated electronics and computer technology to detect, locate, and determine the significance of structural discontinuities or flaws.



THE HARTFORD STEAM BOILER INSPECTION AND INSURANCE COMPANY
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